Uncovering GHG emission characteristics of industrial parks in Central China via emission inventory and cluster analysis

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ABSTRACT

Industrial parks (IPs), called the engine to China's economic growth, have contributed greatly to China's rapid development, while emitting a lot of air pollutants and greenhouse gas (GHG). Establishing GHG emission inventories is so essential to explore the low-carbon strategies in the industrial park level. Taking 11 IPs in Central China as objects, this study has established GHG inventories including direct and indirect emissions, and explored the characteristics from energy types and industrial sectors. On this basis, we adopted cluster analysis to classify these 11 IPs into three categories of "3H (High carbon intensity, High proportion of energy-intensive industries output, and High proportion of coal in energy mix)", "3L (Low carbon intensity, Low proportion of energy-intensive industries output, and Low proportion of coal in energy mix)" and "Mixed" IP, and then selected representative industrial parks for case study. The results show that: Total CO_2 emissions of these eleven parks in Central China in 2017 were 14472.6 kt, and coal consumption was the dominant source of GHG emissions in these parks, accounting for 80.3% of the total. Meanwhile, energy-intensive industries were the main discharging sectors, accounting for 79.6%. Reducing the export of electricity and using renewable energy to replace coal for power generation are crucial to mitigate GHG emission in the IPs including large-scale thermal power plants. Cluster analysis reveals that "3H" and "Mixed" parks should be put in the priority in the GHG mitigation, focusing on traditional energy-intensive industries transformation and energy structure adjustment. This study is helpful to uncover GHG emission characteristics of IPs in Central China, and give some recommendations on GHG mitigation strategies in IPs.

Keywords: industrial park, emission inventory, cluster analysis, GHG mitigation, Central China.